

Enoxaparin – prescribing, administration and monitoring (Adults Only)

Enoxaparin is the low molecular weight heparin (LMWH) used at WUTH.

This guideline covers the following:

1. [Indications](#)
2. [Contraindications](#)
3. [Initiation and dose](#)
4. [Duration](#)
5. [Administration](#)
6. [Monitoring](#)
7. [Reversal](#)
8. [Discharge](#)
9. [Other guidelines](#)
10. [References](#)

This document is a guideline and further information should be obtained from the relevant reference sources.

The enoxaparin product previously expressed strength in milligrams (mg) but this will now be expressed on the product both in international units (IU) of anti-Xa activity and in milligrams (mg): One mg of enoxaparin sodium is equivalent to 100 IU anti-Xa activity. We will continue to use milligrams for prescribing and administering.

1. Indications (see Table 1)

- Venous thromboembolism (VTE) prophylaxis
- Venous thromboembolism (VTE) treatment
- Acute coronary syndrome (ACS)

There are specific guidelines for managing VTE prophylaxis and treatment in:

- Maternity – for all patients who are pregnant and up to 6 weeks post-partum
- Trauma and Orthopaedics
- Surgery

2. Contraindications:

Enoxaparin is contraindicated in patients with:

- acute bacterial endocarditis
- active major bleeding and conditions with a high risk of uncontrolled haemorrhage, including recent haemorrhagic stroke;
- recent thrombotic stroke (should not be used for 14 days due to risk of haemorrhagic transfer)
- thrombocytopenia in patients with a positive in-vitro aggregation test in the presence of enoxaparin (heparin-induced thrombocytopenia [HIT]);
- active gastric or duodenal ulceration;
- hypersensitivity to either enoxaparin sodium, heparin or its derivatives — including other LMWHs;
- Platelet count less than $75 \times 10^9/L$ (refer to haematology if platelets are below this level and treatment is deemed clinically essential)
- Epidural or spinal anaesthesia with treatment doses
- Recent surgery to eye or nervous system
- Severe hypertension

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3. Initiation

The dose and choice of drug is dependent on the patient's renal function (creatinine clearance [CrCl]) and weight. Check renal function using Cockcroft and Gault. Renal function using eGFR is not equivalent to CrCl and cannot be used for dose adjustment in renal impairment. A CrCl calculator is available on the intranet:

<http://apps.wuth.nhs.uk/staff/formulary/calculators.aspx>

Cockcroft and Gault equation for creatinine clearance:

$$\text{Creatinine clearance (mL/min)} = \frac{Y \times (140 - \text{age}) \times \text{weight (kg)}}{\text{Serum creatinine } (\mu\text{mol/L)}} \quad \begin{array}{l} \text{Male } Y = 1.23 \\ \text{Female } Y = 1.04 \end{array}$$

- Use ideal body weight (IBW) in patients unless over or under weight:
IBW Females = [45.5kg + (2.3 x every inch over 5ft)] kg
IBW Males = [50kg + (2.3 x every inch over 5ft)] kg
- Use adjusted body weight in obese patients = IBW + 0.4 x (actual body weight – IBW) kg
- Use actual body weight in underweight patients

VTE assessment to be completed on CERNER for all adult inpatients before enoxaparin is prescribed.

Table 1: Indication for use of enoxaparin

(For alternatives, see specific guidelines for 'Surgery' 'Maternity' and 'Trauma and Orthopaedics')

Indication	Clinical situation	Dose drug and frequency	Renal dose and frequency (Use in CrCl <15mL/min is off label)
VTE prophylaxis (Also see specific VTE guidelines for 'Surgery' 'Maternity' and 'Trauma and Orthopaedics')	Medical patient	Enoxaparin 40mg** once daily	CrCl<30ml/minute enoxaparin 20mg** once daily
	Elective hip replacement	Rivaroxaban 10mg once daily for 35 days	CrCl<15ml/minute (off-label) enoxaparin 20mg once daily for 35 days
	Elective knee replacement	Rivaroxaban 10mg once daily for 14 days	CrCl<15ml/minute (off-label) enoxaparin 20mg once daily for 14 days
VTE treatment	Uncomplicated patients	Enoxaparin 1.5mg/kg [‡] once daily*	CrCl<30ml/minute enoxaparin 1mg/kg [‡] once daily
	All other patients with: • obesity (BMI >30 kg/m ²) • symptomatic PE • cancer • recurrent VTE • proximal (iliac vein) thrombosis	Enoxaparin 1mg/kg [‡] twice daily*	CrCl<30ml/minute enoxaparin 1mg/kg [‡] once daily

ACS	Prophylaxis	Fondaparinux 2.5mg once daily for a maximum of 8 days then switch to enoxaparin	CrCl<20ml/minute enoxaparin 1mg/kg [‡] once daily
	Full anticoagulation [†] in patients UNDER 75 years old	Enoxaparin 1mg/kg [‡] twice daily	CrCl<30ml/minute enoxaparin 1mg/kg [‡] once daily
	Full anticoagulation [†] in patients OVER 75 years old	Enoxaparin 0.75mg/kg [‡] twice daily	CrCl<30ml/minute enoxaparin 1mg/kg [‡] once daily
Mechanical Valve Replacement	Subtherapeutic INRs or interruption to therapy	Enoxaparin 1mg/kg [‡] twice daily Continue until INR in range: • Aortic valves INR >2 • Mitral valves INR >2.5	CrCl<30ml/minute enoxaparin 1mg/kg [‡] once daily

* For 5 days minimum and until INR in range for 2 consecutive days where warfarin is initiated.

****Extremes of actual body weight and VTE prophylaxis:**

	CrCl >30ml/min	CrCl 15-30ml/min	CrCl <15ml/min (Off-label use)
<50kg	20mg once daily	20mg once daily	20mg once daily
100-150kg	80mg once daily	40mg once daily	20mg once daily
>150kg	120mg once daily	60mg once daily	20mg once daily

‡Actual body weight should be used for dose calculation.

†For example, full dosing is required for patients with atrial fibrillation, suspected venous thromboembolism, or a mechanical heart valve

4. Duration:

- VTE prophylaxis to continue for duration of inpatient stay unless VTE or bleeding risk changes. Repeat VTE assessment as per VTE policy
- VTE prophylaxis may continue on discharge for high risk patients
- VTE treatment when warfarin commenced — continue for a minimum of 5 days and until INR is above 2 for two consecutive days
- VTE treatment without warfarin commenced — continue for duration of treatment period
- VTE treatment when DOAC (apixaban, dabigatran, edoxaban, rivaroxaban) started — stop enoxaparin and replace with a DOAC when the next dose is due. If starting dabigatran or edoxaban, the patient must receive enoxaparin for at least 5 days before switching.

5. Administration

Subcutaneous administration. Self-administration of enoxaparin following discharge should be encouraged for patients who are capable; administration by a family member or carer may also be considered. If this happens, a sharps box needs to be supplied. Patients discharged to community care for administration of enoxaparin will need to have a Patient Medication Administration Chart (PMAC) completed prior to discharge.

6. Monitoring

As noted above the dose of enoxaparin needs to be reviewed when renal function is impaired. Enoxaparin can also cause hyperkalaemia and this is more likely to occur with prolonged duration of treatment and/or patients with diabetes mellitus, chronic renal failure, raised potassium levels or if taking potassium-sparing medicines.

All patients on LMWH (prophylactic or treatment) should be monitored clinically for signs of bleeding or other side effects.

Antifactor Xa levels should be considered if a patient is on treatment dose enoxaparin with;

- extreme of body weight (>120kg)
- impaired renal function (<30mL/min)
- elderly (over 75 years)
- concerns re: active bleeding.

Levels should also be considered if treatment is planned for >6 weeks, or if there are clinical concerns.

Antifactor Xa levels need to be taken on the 4th day exactly 4 hours after an injection and doses adjusted accordingly after discussion with haematology, when required. Repeat levels need to be taken 3-4 days later if amendments to the dose are made or if the patients clinical condition changes. The peak target range of anti Factor Xa for treatment dose is 0.4 -0.8 unit/mL.

This level should be done prior to discharge or should be arranged with the GP practice/in the community and is the responsibility of the prescribing doctor/team. It should be made clear in the discharge letter whether a level has been done or when one is needed.

Table 2: **Monitoring of enoxaparin**

Patient group	Parameter	Frequency	Action
All patients	FBC U&E	<ul style="list-style-type: none">• Baseline• Daily for acutely unwell inpatients	If 30% or more reduction in platelets and patient develops new thrombosis or skin allergy between days 4 and 14 of heparin administration then HIT should be considered and investigated
Post-operative patients including cardiopulmonary bypass patients who have	Platelets U&E	<ul style="list-style-type: none">• Baseline• 24 hours after starting	

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been exposed to heparin in the previous 100 days and receiving any type of heparin		enoxaparin	Check creatinine clearance and amend dose as necessary
Patients on LMWH >3 months.	FBC, U&E Anti-Xa levels Bone densitometry	Every 3 months or if the patients clinical condition changes	

7. Reversal

If urgent reversal is required protamine can be used up to a maximum of 50mg. Within 5 minutes of being administered, protamine acts to neutralise the effects of enoxaparin. However, at maximum, it only neutralises 60% of enoxaparin's effect. The dose depends on the time since the enoxaparin was given:

- If enoxaparin given LESS than 5 hours ago, give 1mg protamine for every 1mg enoxaparin administered
- If enoxaparin given MORE than 5 hours ago, give 0.5mg protamine for every 1mg enoxaparin administered

Patients should be carefully monitored using either the activated partial thromboplastin time or the activated clotting time — carried out 5-15 minutes after protamine administration. Further doses may be needed because protamine is cleared from the blood more rapidly than heparin, especially low molecular weight heparin. In gross excess, protamine itself acts as an anticoagulant.

8. Discharge

Where enoxaparin is prescribed on discharge, the prescriber must provide clear instructions to the patient's GP regarding the dose of enoxaparin and the duration of treatment. Where treatment is intended to last longer than 3 months, a referral to haematology must be made to discuss this further.

If a patient medication administration chart (PMAC) is required for DVT service or community nurse administration, this must include the patient's weight (in kilograms) and renal function and be completed in full by the prescriber.

When clinically checking the discharge prescription, at minimum, the ward pharmacist must ensure that the above information has been completed by the prescriber and is available on the discharge letter. The ward pharmacist should then complete the checklist below and endorse 'IDDAM' on the discharge prescription to indicate that the above checks are complete before any supplies of LMWH will be made on discharge. Up to 2 weeks' supply of LMWH will be made by the hospital at discharge and then this should be continued by the patient's GP.

- Appropriate Indication (if on extended duration of LMWH due to poor compliance, must state in the notes that the decision has been approved by the senior medical staff)
- Dose – appropriate for the patient’s renal function and weight
- Duration
- Appropriately trained person to Administer the LMWH in the community if the patient is unable to self-administer.
- Monitoring. The patient has been referred to haematology by the clinician for ongoing monitoring for patient’s receiving extended LMWH treatment

9. Other related trust guidance

A list of all guidelines relating to anticoagulation can be found under “anticoagulation” within the clinical guidelines section of the intranet.

<http://www.wuth.nhs.uk/staff/clinical/clinical-guidance/>

10. References

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